Papahānaumokuākea Marine National Monument
Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Michael S. Rappe
Affiliation: SOEST, Hawaii Institute of Marine Biology, University of Hawaii at Manoa

Permit Category: Research
Proposed Activity Dates: May 15, 2008 - September 15, 2008
Proposed Method of Entry (Vessel/Plane): Vessel, NOAA Ship HIIALAKAI
Proposed Locations: Shallow water habitat around Kure Atoll, Midway Atoll, Pearl and Hermes Atoll, and Nihoa Island.

Estimated number of individuals (including Applicant) to be covered under this permit:
7
Estimated number of days in the Monument: 30

Description of proposed activities: (complete these sentences):

a.) The proposed activity would…
enable researchers to 1) assess the community structure (diversity and relative abundance) of microbes, particularly Bacteria, associated with different species of healthy and health-compromised (e.g. diseased or bleached) corals and reef water across the Papahanaumokuakea Marine National Monument, 2) determine if coral-associated microbial communities vary seasonally and/or geographically, 3) determine if coral-associated bacterial community assessments can be used to indicate a coral's health state and to predict its susceptibility to bleaching and/or disease, and 4) determine the extent to which microbial pathogens are present on Monument reefs.

b.) To accomplish this activity we would ….
continue our ongoing effort to thoroughly sample and characterize microbial communities from diverse coral species encountered in various health states throughout the Papahanaumokuakea Marine National Monument. Additionally, we will collect surface seawater samples within the Monument to determine the spatial and geographic variability of these microbial communities compared to those associated with corals. All sampling will be conducted using minimally-invasive, non-lethal techniques and sample sizes are limited to the amount needed to perform meaningful statistical analyses.

c.) This activity would help the Monument by …
Gaining a solid understanding of the possible roles that Bacteria play in maintaining and/or destabilizing coral health is essential if we are to effectively prevent disease from causing widespread harm to Hawaii's coral reef ecosystems. The methods employed in this study may enable us to determine a coral's health state at a given point in time and to predict a coral's susceptibility to disease under different environmental variables. If we are able to determine which coral species are the most susceptible to disease, and how this susceptibility changes under varying environmental conditions, we can take special steps to enhance the survival or recovery of this species. Disease prevention management may include establishing protected areas for more sensitive, disease prone coral species, as well as for coral species that are more robust and resilient to disease, reducing human impacts that may increase a coral's susceptibility to disease, prohibiting the introduction of any foreign materials or pollutants that may alter coral-associated microbial communities, and other measures that will help to prevent the spread of disease. Most importantly, we believe that our study methods will enable us to detect physiological stress in a coral before the onset of disease occurs. By identifying the early warning signs of disease, we can potentially prevent disease from spreading to epizootic proportions by developing methods to effectively treat or quarantine diseased corals. Finally, this study should enable us to identify invasive microbial pathogens, determine their source, and begin to develop methods that will prevent them from entering the pristine coral reef ecosystems of the Papahanaumokuakea Marine National Monument.

Other information or background:
Samples for this study have been collected on four previous cruises to the Papahanaumokuakea Marine National Monument in May 2005, September 2005, May 2006, and September 2007. The goals and objectives for the 2008 cruise period are to continue our assessment of microbial community structure and invasive microbial pathogens in corals over spatial and temporal scales within the Monument. Specifically, we would like to return to sites at Kure Atoll, Midway Atoll, and Nihoa island where we have previously sampled coral-associated microbes to assess how these communities vary seasonally and also to increase our spatial coverage of these reefs. These atolls were previously visited during the September 2005 cruise. Most importantly, we want to focus on collecting samples from health compromised (e.g. bleached and diseased) coral colonies to determine whether or not microbial communities differ between healthy and health-compromised corals of the same species and to identify the microorganisms that may be associated with coral disease in the monument.